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METHODOLOGICAL ISSUES

GUIDELINES UNDER ARTICLES 5, 7 AND 8 OF THE KYOTO PROTOCOL

Experience of Annex I Parties with existing national systems for preparing greenhouse gas inventories

Note by the secretariat

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I. INTRODUCTION

A. Mandate

1. Article 5.1 of the Kyoto Protocol states that each Annex I Party shall have in place, no later than one year prior to the start of the first commitment period, a national system for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol.

2. At its tenth session, the Subsidiary Body for Scientific and Technological Advice (SBSTA) requested the secretariat to organize a workshop on national systems and issues relating to adjustments, referred to in Article 5 of the Kyoto Protocol, before its twelfth session (FCCC/SBSTA/1999/6, para. 34 (d)). At its eleventh session, the SBSTA requested the secretariat to prepare documentation for consideration at the above-mentioned workshop (FCCC/SBSTA/1999/14, para. 51 (c)) on the experience of Annex I Parties with existing national systems for preparing greenhouse gas inventories.

B. Scope

3. This note responds to the request by SBSTA for information on existing national systems for preparing greenhouse gas inventories. This information is intended to assist Parties in considering how to design guidelines for national systems under Article 5.1 of the Kyoto Protocol.[1] The note summarizes information on the current practices in some Annex I Parties and identifies issues relevant to the existing national systems for the preparation of greenhouse gas inventories, including timing and frequency of submission of these inventories.

4. The main findings of this paper were presented during the workshop mentioned in paragraph 2 above, which was held in Bonn from 14 to 16 March 2000.

C. Approach

5. The information presented in this paper was obtained during a number of country visits (Australia, Canada, Greece, Ireland, Italy, Japan, the Netherlands, the Russian Federation, Ukraine, the United Kingdom of Great Britain and Northern Ireland and the United States of America)[2] and from in-depth review reports for these Parties. Additional information, used for the purpose of this paper, was made available during a workshop held in cooperation with the United Nations Institute for Training and Research (UNITAR), in Geneva from 30 November to 2 December 1999, on the new UNFCCC guidelines on annual inventories and options to address challenges facing Annex I Parties with economies in transition in preparing greenhouse gas

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[1] A draft of the guidelines under Article 5.1 of the Kyoto Protocol is contained in document FCCC/SBSTA/2000/INF.5/Add.1.

[2] For Greece, the Russian Federation and Ukraine, the visits were scheduled at the same time as the in-depth review of the national communication.

inventories (FCCC/SBSTA/2000/INF.1). Other source documents include a report on national greenhouse gas emissions inventory submissions from Annex I Parties for 1990 to 1996 (FCCC/SBI/1999/5), a report on national greenhouse gas inventory data from Annex I Parties for 1990 to 1997 (FCCC/SBI/1999/12) and a report on methodological issues identified while processing greenhouse gas inventory data submitted by Annex I Parties (FCCC/SBSTA/1998/7).

6. In the context of this paper, the term *existing national systems* is used to describe the general framework that already exists in Annex I Parties for estimating greenhouse gas emissions and removals and reporting and archiving greenhouse gas inventory information. It does not refer to future national systems to be developed under Article 5.1 of the Kyoto Protocol.

7. This paper constitutes a compilation of identified issues in the context of existing practices in some Annex I Parties and makes no attempt to address particular inventory problems, as in document FCCC/SBSTA/1998/7, or to assess the effectiveness of the implementation of various practices. The paper does not provide a comprehensive list of all the issues and problems identified during the country visits, but focuses rather on those aspects of the existing national systems that were considered as most pertinent for the drafting of guidelines for national systems under Article 5.1.

D. Possible action by the SBSTA

8. The SBSTA may wish to take the information in this paper into account when considering the guidelines on national systems under Article 5.1 of the Kyoto Protocol.

II. EXISTING NATIONAL SYSTEMS

9. In accordance with Articles 4 and 12 of the Convention, Annex I Parties are required to communicate to the Conference of the Parties (COP), through the secretariat, a national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol. The guidelines for reporting greenhouse gas data were originally adopted by the COP at its second session (decision 9/CP.2) and were recently revised, at its fifth session (decision 3/CP.5).

10. The majority of Annex I Parties have developed national systems for estimating and reporting greenhouse gas inventory information. These systems are both formal and informal, encompassing the institutional, legal and procedural arrangements between the various competent bodies that are responsible for specific functions related to the planning, preparation and management of the greenhouse gas inventory.

11. Information on these systems related to activity data, methods and emission factors, quality of inventory data, timing and frequency of submissions and archiving of information, is presented in the following sections.

A. Institutional and procedural arrangements

1. Background

12. The responsibility for submitting greenhouse gas inventories to the secretariat lies with the national focal points. These may be governmental institutions (ministries, departments, offices, agencies) responsible for domestic and/or international environmental matters. In many cases, however, the national focal points are not directly involved in the preparation of the greenhouse gas inventories. This task is usually assigned to specialized national organizations through some form of legislative action, and/or to consultants under a limited time contract. Examples of the arrangements that exist in some Annex I Parties are provided in box 1.

13. In some Annex I Parties, there also exist inter-agency, inter-ministerial or expert advisory committees, acting as intermediaries between the national focal point and the inventory experts. These committees provide technical assistance and/or approve the national greenhouse gas inventory, before it is submitted to the secretariat. In other cases, the inventory is subject to an internal review process involving field experts, academics, the business community, non-governmental organizations and the general public.

14. It is not uncommon for organizations responsible for the preparation of the greenhouse gas inventory to establish cooperative agreements and/or subcontracts with other national institutions and consultants, if in-house expertise is limited or if greenhouse gas estimates for particular inventory sectors are being compiled separately. There is no common framework that describes the way that ministries cooperate with other national institutions, which is usually through internal organizational agreements, personal contacts and customary practices.

15. The level of involvement of local governments and various industrial groups varies among Annex I Parties. Traditionally, such an involvement has been sought during the design of environmental legislation and action plans, usually in connection with environmental problems other than climate change. In some cases, local authorities or companies have the responsibility to implement such legislation, including the maintenance of local or regional emissions registries for monitoring purposes. A number of Annex I Parties have initiated national programmes that involve the development and enhancement of such emissions registries that could be used for climate change purposes.

16. Some Annex I Parties include locally and regionally estimated greenhouse gas data for some sectors or activities in their national emissions totals. Other Annex I Parties include in their national submissions greenhouse gas data for their territories and provinces, which are estimated centrally by the organization responsible for the preparation of the national inventory and are approved by the local governments. Annex I Parties that are involved in the CORINAIR[3] programme, also estimate local and regional emissions on a regular basis. These emissions are not reported, since there is no requirement to do so under the Convention.

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[3] CORINAIR is the component dealing with air emission inventories of the European Community CORINE (Coordinated Information System on the State of Natural Resources and the Environment). CORINAIR is also used for reporting to the Convention on Long-range Transboundary Air Pollution under the auspices of the United Nations Economic Commission for Europe.

Box 1. Examples of institutional arrangements in some Annex I Parties

Australia
National focal point: Australian Greenhouse Office
Inventory preparation: Consultants
Arrangement: Contracts

Canada
National focal point: Environment Canada
Inventory preparation: Environment Canada
Arrangement: Government Organization Act

Greece
National focal point: Ministry of the Environment, Physical Planning and Public Works
Inventory preparation: National Observatory of Athens
Arrangement: Contract

Ireland
National focal point: Department of Environment and Local Government
Inventory preparation: Environmental Protection Agency
Arrangement: Environmental Protection Act

Italy
National focal point: Ministry of the Environment
Inventory preparation: National Agency for the Protection of the Environment (ANPA)
Arrangement: National Environmental Information System (managed by ANPA)

Japan
National focal point: Environment Agency
Inventory preparation: Sanwa Research Institute and Consulting Corporation
Arrangement: Contract

the Netherlands
National focal point: Ministry of Housing, Spatial Planning and the Environment
Inventory preparation: National Institute of Public Health and the Environment (RIVM)
Arrangement: Environmental Management Act

Russian Federation
National focal point: Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet)
Inventory preparation: Institute of Global Climate and Ecology (attached to Roshydromet)
Arrangement: Federal Programme for the Prevention of Dangerous Impacts of Climate Change and its Negative Consequences

Ukraine
National focal point: Ministry of Environmental Protection and Nuclear Safety
Inventory preparation: Agency for Rational Energy Use and Ecology
Arrangement: Contract

United Kingdom
National focal point: Department of the Environment, Transport and the Regions
Inventory preparation: AEA Technology (National Environment Technology Centre)
Arrangement: Contract

United States of America
National focal point: State Department
Inventory preparation: Environmental Protection Agency (EPA)
Arrangement: Memorandum of Understanding

17. The time taken to complete a national greenhouse gas inventory varies considerably among Annex I Parties. For some Parties, it is a year-round process, which starts once the previous inventory has been completed, while for other Parties, especially some Annex I Parties with economies in transition, it lasts for a few months depending on the resources available for this purpose.

2. Relevant issues

18. In some Annex I Parties, there is limited or no cooperation between the organization responsible for the preparation of the inventory and other national institutions, e.g. statistical offices, mostly because of lack of a national legislative framework, or other institutional arrangements, describing or delegating the responsibility for various aspects of the inventory development process to the appropriate national entities. In some cases, this results in either complete lack of underlying information for particular sectors or activities of the inventory or use of partial information from alternative sources that may maintain relevant data sets for different purposes.

19. The difficulties that some Annex I Parties with economies in transition have reported are primarily associated with the lack of financial resources for the inventory development process. In many of these Parties, there is usually no permanent staff; rather experts are hired on limited time contracts. This approach has an adverse effect on the continuity and consistency of the information submitted, especially if the inventory experts change from year to year, and if modifications or clarifications are required in the time period between the submission of inventories. Other problems that these Parties face include communication difficulties resulting in limited or no flow of new information to inventory experts and limited or no participation of these experts in training and other workshops to enhance their working skills.

20. As mentioned in paragraph 13 above, Annex I Parties follow different approaches for the approval of their greenhouse gas inventories, prior to their submission, varying from no formal approval procedure to a full-scale review process involving all stakeholders. In most Annex I Parties the final greenhouse gas inventory, including activity data, emission factors, use of new and/or revised information and any recalculations of estimates that were submitted in previous inventories, is only approved by the inventory experts responsible for the preparation of greenhouse gas estimates. The submissions by Annex I Parties, annual greenhouse gas inventories and national communications, do not generally include information on the approval process used by each Party.

B. Activity data

1. Background

21. The compilation of activity data and other statistical information necessary for the preparation of greenhouse gas inventories is generally the mandate and responsibility of national statistical offices, ministries and State or local agencies. Other organizations, for example, research institutes, non-governmental organizations and the business community, also maintain

relevant data sets either as part of their research activities or for monitoring purposes. In most Annex I Parties, the aforementioned entities are not directly involved in the preparation of greenhouse gas inventories.

22. There is no common approach among Annex I Parties to collecting statistical information. To achieve different purposes, Parties use questionnaires, sampling surveys and regular national censuses, that vary in scope, coverage and periodicity. No Annex I Party has a single publication that covers all activity data necessary for the preparation of a greenhouse gas inventory. Instead, activity data are published in a number of reports, at different times and by various institutions.

2. Relevant issues

23. In most Annex I Parties, the cooperation between statistical offices and inventory institutions does not extend beyond the communication of statistical data from the former to the latter. Inventory experts are not usually aware of the methods used by the various organizations for the collection and processing of the statistical information that is used for the preparation of the greenhouse gas inventories. Only a limited number of Parties employ statisticians or personnel with some knowledge of the statistical system of the country, in the inventory development process.

24. Publication of statistical information, which usually occurs at regular intervals, does not take into account the timing needs of the inventory preparation process. Delays in the publication of statistical data constitute one of the major reasons for gaps in greenhouse gas inventory information for particular years or sectors and for delays in the preparation and submission of inventories to the secretariat.

25. In some Annex I Parties, information for particular sectors is collected and published by more than one organizations. Inventory experts have the responsibility for selecting the most appropriate data sets for the preparation of the inventory based on the confidence in the source, the continuity and consistency of the information provided, and the quality of the data. The inventories submitted to the secretariat do not contain any information on any implications that the use of these data sets might have on the reported greenhouse gas estimates. In other Annex I Parties, however, the statistical information for particular sectors is either not available at all or is not published in an appropriate form for the preparation of the inventory. In such cases, the inventory experts resort to the use of very simple approaches (e.g. tier I methods) and/or make certain ad hoc assumptions for extracting the necessary statistical information from what is already available.

26. In some countries, publication restrictions, mostly because of confidentiality issues for certain industrial activities, affect the amount of data made available to the general public, including inventory experts. Gaps in the official national statistics are often filled through direct contact between the inventory organizations and certain industries or industrial groups. However, the cooperation of the various stakeholders is not always guaranteed or forthcoming and usually disclosing such information follows the provision of assurances for the maintenance of the confidential nature of the data.

27. The structural reorganization that has taken place in Annex I Parties with economies in transition since 1990 has posed hurdles for these Parties in providing complete greenhouse gas inventory data. The most common problems identified by Annex I Parties with economies in transition were outlined in document FCCC/SBSTA/2000/INF.1. The major challenges these Parties face are:

(a) Harmonization of the national statistical systems with international standards;

(b) Incompatibility of statistical classifications and inventory data format;

(c) Limited experience with managing and processing statistical information;

(d) Lack of archived data due to internal changes and shifts of responsibility to and from different institutions; and

(e) Limited information regarding the use, imports and exports of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

28. The problem related to the availability of information on HFCs, PFCs and SF_6 is not only relevant to Annex I Parties with economies in transition, as indicated in document FCCC/SBI/1999/12.

C. Methods and emission factors

1. Background

29. All Annex I Parties use the flexibility provided by the IPCC Guidelines[4] concerning methods and emission factors. They use a mixture of default and more advanced methods, either from the IPCC Guidelines or from national or other compatible methodologies, such as CORINAIR.

30. In addition to default emission factors, Annex I Parties also use national emission factors in order to reflect their national circumstances for certain activities. In most cases, such emission factors are the result of direct measurements of certain gases from various industrial activities, usually monitored for other reasons such as air pollution. Other sources of national emission factors are the results of research of particular interest in some Parties, although most of such research has not been exclusively commissioned for climate change purposes.

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[4] Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories.

2. Relevant issues

31. Decisions relating to both methods and emission factors are usually taken by inventory experts and depend on the availability of underlying information for certain activities. In some Annex I Parties, the inventory experts consult other organizations and national experts before a final decision is taken, while in other cases, the decision is left entirely up to experts.

32. In some Annex I Parties, there is limited or no availability of national emission factors for some inventory categories and/or gases. These Parties, and particularly those with economies in transition, usually use default emission factors that may not reflect their national circumstances and could possibly result in under- or overestimation of emissions from particular sectors of the national greenhouse gas inventory.

D. Quality of inventory data

1. Background

33. The quality of the greenhouse gas inventory information depends on the quality of the underlying activity data and emission factors used. In all Annex I Parties, the organizations involved in collecting statistical data and/or developing emission factors are primarily responsible for ensuring the quality, regularity and completeness of the data through the application of quality assurance and quality control (QA/QC) procedures. These include, among others, trend checks, cross-referencing with related data collected elsewhere and expert judgement. However, the uncertainty associated with such information is usually either not available in a form that can be used by inventory experts or does not exist at all.

34. There is no common approach among Annex I Parties for ensuring and reporting the quality of inventory data, which depends on the application of appropriate quality control and quality assurance procedures. In most Parties, the implementation of quality control activities relies heavily on the expertise and experience of the personnel involved in the preparation of the greenhouse gas inventory.

2. Relevant issues

35. Although ensuring the quality of statistical information is an ongoing process in a number of Annex I Parties, statistical publications do not usually contain information about the quality of the statistical data. For example, sampling errors, non-sampling errors and quantified uncertainty estimates related to particular surveys are not published as part of the national statistics.

36. There is limited or no consistency in the provision of qualitative information, especially in the use of the IPCC overview table, and quantitative information that is usually based on expert judgement. Some Parties provide uncertainty estimates for some greenhouse gases either as ranges or single values, while one Party used a rounding protocol for its complete inventory data.

E. Timing and frequency of inventory submissions

1. Background

37. At its second session and subsequently at its fourth session (decisions 9/CP.2 and 11/CP.4), the COP requested Annex I Parties to submit to the secretariat national inventories of greenhouse gases on an annual basis by 15 April for the period up to the last but one each year prior to the year of submission.

2. Relevant issues

38. Twenty-six of the 39 Annex I Parties,[5] submitted their greenhouse gas inventories by the end of 1999 and two more Parties submitted greenhouse gas inventory data as part of their national communication. Five inventory submissions reached the secretariat by 15 April 1999. Another nine submissions were received with a delay varying between four and 25 days from the official submission deadline, while the remaining 12 submissions were received with a delay of two to eight months. A similar situation was also recorded in 1998 (FCCC/CP/1998/INF.9).

39. Some Annex I Parties submit information in draft or preliminary form, or in parts, or submit subsequent revisions to their inventories. Not all reporting Parties provide their greenhouse gas inventory data on an annual basis and for all the years in the period specified by decisions 9/CP.2 and 11/CP.4. In 1999, fifteen Parties provided data for the period 1990-1997 and eight Parties only for the year 1997. The other Parties provided information for some of the years in the period 1990-1997. Other issues related to completeness, consistency and comparability of the submitted inventory data were addressed in document FCCC/SBI/1999/5.

40. The timely preparation and submission of greenhouse gas inventories depends on a number of factors. Some of the most common causes of delay in this process relate to:

(a) Availability of resources;

(b) Difficulties in the cooperation between the entities responsible for the preparation of the inventory and other institutions responsible for other functions, e.g. statistical offices; and

(c) Timely availability of statistical data.

41. The issues identified in paragraph 40 above were also highlighted and discussed under other aspects of the existing national systems.

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[5] Belarus and Turkey have not as yet deposited an instrument of ratification, acceptance, approval or accession to the Convention.

F. Archiving of information

1. Background

42. The responsibility for archiving the inventory information lies primarily with the organization responsible for the inventory preparation, while in some countries this information is also stored and maintained by the national focal point. The majority of Annex I Parties use an elaborate set of spreadsheets for storing all relevant information (activity data and emission factors) and for estimating greenhouse gas data. Only a few Annex I Parties maintain a dedicated database for this purpose, e.g. countries that use the CORINAIR software.

2. Relevant issues

43. There is limited consistency among Annex I Parties in archiving disaggregated activity data and emission factors that would enable the reconstruction of inventory data. Although the majority of these Parties maintain all data sets used for previous inventory submissions, in some Parties older inventory data sets either are "overwritten" for new submissions or are not available because of the shift of responsibility for inventory preparation between different institutions.

III. CONCLUSIONS

44. National circumstances, as well as past and present practices, are of particular importance in the development of domestic national systems for the preparation of greenhouse gas inventories. Although some common problems for Annex I Parties were identified, the severity of these problems and their consequences for the inventory development process vary from country to country.

45. There is a distinct difference in the structure of the existing national systems between Annex II Parties and Annex I Parties with economies in transition. In general, the former tend to have a better developed national system than many of the latter Parties, which may rely on external financial support and expertise and/or sporadic preparation of greenhouse gas inventories due to the low level of priority associated with this process.

46. Some of the issues identified in the previous sections and possible courses of action in the development of national systems under Article 5.1 are presented in box 2. These issues might be taken into consideration in the further development of the guidelines for national systems.

Box 2. Issues identified and possible courses of action

Issues identified	Possible course of action
Limited or no formal procedures related to the inventory development process	✦ Elaboration and publication of an appropriate national plan, including planning, preparation, reporting, management and the delegation of responsibility for various aspects of the inventory development process ✦ Provision of adequate financial support
Limited or no cooperation between different institutions and problems in the communication of information	✦ Establishment of the appropriate institutional and legal arrangements for defining the responsibility and ensuring the flow of information among different entities involved in the inventory development process. ✦ Development of the necessary infrastructure for exchange of information with the assistance of electronic means of communication.
Limited or no formal procedures for the approval of national inventories and other inventory data	✦ Implementation of the necessary procedures to ensure the official consideration and approval of the inventory data, including use of new and revised emission factors and recalculated estimates
Limited or no information on the quality of statistical data and national emission factors	✦ Publication of the relevant information necessary for the estimation of uncertainties associated with the statistical data and national emission factors used for the inventory information. ✦ Establishment of the necessary institutional procedures between inventory and statistical organizations for ensuring the training and enhancing the awareness of personnel on cross-cutting issues related to the inventory development process ✦ Provisions for the application of the appropriate QA/QC procedures in accordance with any *good practice guidance* agreed by the COP, taking into consideration of the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories

Box 2. Issues identified and possible courses of action *(continued)*

Missing statistical data and emission factors for key sectors and/or for the estimation of specific greenhouse gases	✦ Provisions for the allocation of the necessary resources to enable collection and publication of statistical data and development of emission factors for identified key sources and/or gases ✦ Provisions for the application of the appropriate procedures for identifying key sectors in accordance with any *good practice guidance* agreed by the COP, taking into consideration the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories
Need of harmonization and compatibility of statistical data and delays in the availability of statistical publications	✦ Restructuring of the statistical collection system taking into account the specific needs of the national inventory, including timing of submissions
Data confidentiality	✦ Development of the necessary provisions for allowing access to confidential data used in the inventory preparation
Delays in the submission of inventories	✦ Identification of the major factors responsible for delays in the preparation of the inventories and development of an appropriate domestic processes to minimize such delays
Limited or no archiving of information	✦ Development of the appropriate procedures and delegation of the responsibility for archiving all the information, including all statistical data and emission factors necessary to reconstruct a greenhouse gas inventory

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